MARINE REVIEW.

VOL. X. CLEVELAND, O., OCTOBER 25, 1894. No. 17.

A Modern Lake Freight Steamer.

In a double-page supplement accompanying this issue, the REVIEW presents to its readers an excellent picture of the steamer Globe, the latest freight carrier built by the Globe Iron Works Company of Cleveland. The engraving is from a photograph taken just previous to the steamer's departure, a few days ago, on her first trip. In this ship, the officers of the Globe company, who built her on their own account and in accordance with their idea of a modern lake freighter, claim to have the strongest vessel on the lakes. The boat was built with a view to taking full advantage of 20 feet draught when government works now under way on the lakes provide such draft, and on this account she was made 25 per cent. stronger throughout and 50 per cent. stronger in the sheer-strake than the ordinary steel freight carrier of her size. Leading particulars of the boat follow:

Length, keel	328½ feet
Length, over all	348½ "
Beam	42 "
Depth, moulded	28 "
Capacity, cargo, 18 feet draught	4,218 net tons
Capacity, coal bunkers	250 "
Capacity, water bottom	1,400 "
Engines, vertical quadruple expansion.	
High pressure cylinder	24 inches
Intermediate, "	39 "
Low, "	63 "
Stroke	42 "
Boilers, two of Scotch type.	
Diameter	16 feet
Length	12½ "
Weight, each boiler	70 tons
Furnaces, four, each of	46 inches
Wheel, sectional.	
Diameter	14 feet
Pitch	17 "

Material throughout this steamer is open-hearth steel, made to required tests at the mill and subject to approval at the ship yard. All scantlings were increased over ordinary construction, and through the sheer-strake the thickness is 2 inches. Requirements as to material exceeded the rules of the United States Standard Register of Shipping in a very large measure, and the boat is given the highest class awarded by that association. A 54-inch water bottom runs the entire length of the vessel and it is divided into eight compartments, having an aggregate capacity of 1,400 net tons. In coarse freight the new boat's capacity is calculated as follows on the draughts noted:

Draught.	Capacity. net tons.
15 feet	3,000
16 "	3,390
17 "	3,785
18 "	4,218

On 18½ feet draught it is calculated that she will carry 151,000 bushels of wheat, allowing an open space of one foot below deck beams, and on 14 feet draft her capacity for oats is put down at the same figure.

There are eight gangways and nine hatches in the boat. Gangways all open inwardly and are handled like doors, and the hoisting apparatus for package freight is suited, in the handling of flour, to hoist eight barrels at a time from each of the nine hatches.

Leading particulars of engines and boilers are given in the table appearing above, and it will be noted from the diameter of boilers that they are probably the largest ever built in this country. They are certainly the largest ever built on the lakes. Steam windlass, steam capstans and steam steerer, as well as the several other late appliances suited to a ship of this kind, were made by the builders. There are two separate electric plants, each of 120 lights, installed by the Fisher Electric Manufacturing Company of Detroit. When the boat is under way it will be necessary to use only one of the plants, but when handling cargo in port the entire equipment may be utilized. Another feature peculiar in this boat is an increase in bunker capacity, which is secured by carrying the boiler house forward, and thus providing space for extra fuel that is usually carried on deck on trips up the lakes. In the forward house there are in addition to captain's quarters of the usual kind, two spare rooms with bath rooms, closets, etc. Quarters for the crew are roomy and in every way equal to provisions made in this regard on the best of lake freight steamers. The photograph from which the engraving was made was taken by J. B. Clark of Cleveland.

Drainage Canal and Lake Levels.

THE REVIEW of the 10th inst. contained a communication from Mr. Richard P. Joy of Detroit, relative to the effect of the Chicago drainage canal on levels of the lakes and connecting waterways. Mr. Joy's communication was accompanied by a letter from Gordon H. Knott, engineer of Chicago, who is of the opinion that the lakes will suffer by the diversion of a large quantity of water, estimated at 600,000 cubic feet per minute, to to the Illinois and Mississippi rivers through the Chicago canal. Another communication from Mr. Joy appears in this issue. Of course this question is not by any means a new one, as it has been discussed by some of the best known engineers of this country, but prominence was given to the communications referred to, with a view of determining whether there was a disposition among vessel interests on the lakes to again enter into a discussion that might be sought by opponents of the drainage canal project. The matter has not been taken up, and the indications are that there is little disposition among lake interests to again enter into it, notwithstanding Mr. Joy's earnestness on the subject. Although it is admitted that the lowering which the lakes will be likely to suffer by the withdrawal of 600,000 cubic feet of water per minute through another outlet may amount to as much as 5 or 6 inches, there is another side of the subject.

Anything which tends toward the improvement of harbor facilities at Chicago is indirectly advantageous to Lake Erie harbors having shipping relations with that port. If this is true, it will be well for Lake Erie vessel men to think twice before antagonizing the Chicago drainage canal, which has for a secondary object the opening up of an interior harbor through that city 24 feet deep and 30 miles long. Another important reason why it is not advisable to again open up this matter is that with the data now at the disposal of engineers, but little more can be said than has already been stated in the various discussions by civil and army engineers, and it would seem that opposition to the Chicago project on the score of its effect on lake levels was, with the data at hand, quite well presented before the work was begun. This is one reason why vessel owners and others interested in the lake marine, who have been consulted on the subject of late, are lacking in interest. They are not satisfied with estimates as to the effect of the new outlet on lower lake levels, but can only hope to have this question finally settled by a thorough hydrographic survey of the St. Clair river, conducted in such a manner as to definitely bring out the facts.

Then, too, the scheme of a dam in Niagara river is enlisting many influential advocates, who are not at all opposed to the drainage canal project. Representatives from leading lake cities in the recent waterways convention at Toronto had passed a resolution asking for the appointment of an international commission of engineers to fully investigate this whole outflow problem. Commenting on the resolution calling for the appointment of this commission of engineers, a gentleman who has been in touch with all matters pertaining to lake improvements for a great many years past says:

"If this idea is carried out, all matters pertaining to lake levels and the effect of any given work upon them will be so thoroughly settled that it will be entirely useless to quote anything but facts in discussion. Until more reliable data is obtained, it is my opinion that any discussion of the subject brought up about the Chicago canal will leave the public just as much at sea as to the real truth as they are at present. Mr. T. T. Johnson, in a recent paper before the Western Society of Engineers, arrives at the conclusion that the change of lake level may amount to from 5 to 6 inches. There is no doubt in my mind but that the interests of Cleveland and Chicago lie in the same direction, viz: To pull together for the improvement of Lake Erie harbors by a general raising of the lake level by a regulating dam at Buffalo. To raise the level of Lake Erie 3 feet would have an indirect effect on the level of Lakes Michigan and Huron of more than double the amount that the drainage canal can possibly lower it."

Capt. Harris Baker of Detroit will endeavor to secure a part or all of the $20,000 worth of steel billets that made up the cargo of the schooner Alva Bradley, sunk near North Manitou island. He is working on a contract taken by Parker & Millen of Detroit, who gets about 40 per cent. of the value of billets recovered.

A Striking View of the Drainage Canal Work.

Probably in no work ever undertaken in this country has there been such a variety of excavating machinery as that found in the portion of the Chicago drainage canal now being constructed. Numerous contractors are engaged in constructing the canal and all have selected their own plants. In a recent issue of the Scientic American several of the plants are illustrated. The most striking of the machines as well as the most impressive view of the work is found in the illustration on this page. Here are shown two of the giant Brown cantilever machines, working in a rock section. The sides, nearly vertical, have been cut in the solid rock by a channeling machine of which fifty-seven have been employed at one time on the canal. On the bank the cantilevers travel on rails. The sloping trusses provide an inclined track for carrying up the loaded buckets and delivering their contents far up on the bank. The great trusses are 342 feet long and each machine disposes of 600 cubic yards per day, principally of rock blasted out by dynamite. One of these machines can deliver material from the far side of the canal over a mountain of debris 90 feet high. They represent the highest degree of efficiency on the entire work.

For Sick and Disabled Life Savers.

In accordance with the act of the last congress extending the benefits of the marine hospital service to keepers and crews of life saving stations, Supervising Surgeon-General Wyman of the hospital service has issued a circular of instructions. Under the rulings made by the surgeon-general, the life savers are not to have the full benefits of the service. They will be treated in marine hospitals under control of the government, but not in contract hospitals nor at their homes, and will receive dispensary or out-relief only at the dispensaries connected with said marine hospitals. Thus it follows that there will be only three points on the lakes, Chicago, Detroit and Evansville, where sick or disabled life savers will be entitled to relief, as hospitals under full control of the government are located at these points only.

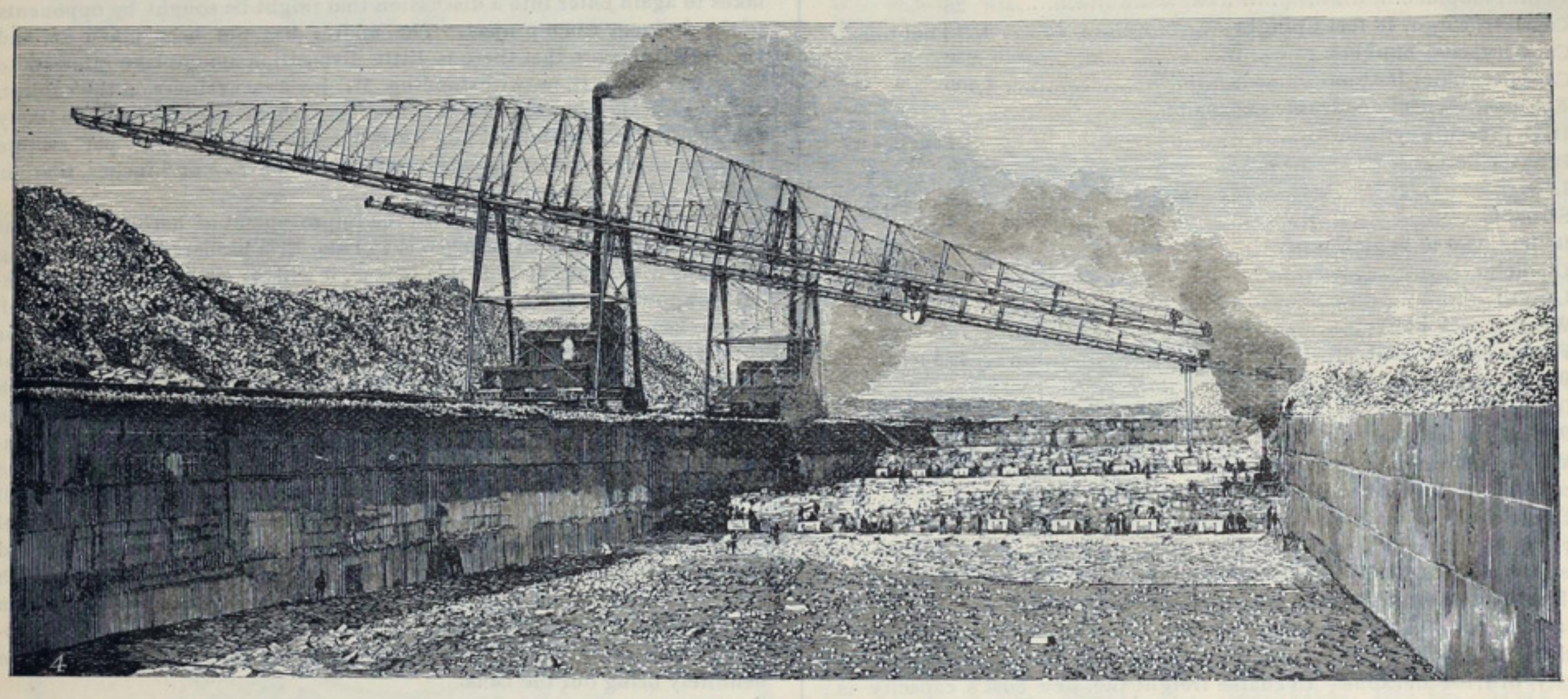
No transportation will be furnished except by ambulance, in cases requiring its use, between the office or hospital and the most convenient railroad station or steamboat landing. An applicant must present a certificate, signed by a keeper, district superintendent, or assistant inspector of the life saving service, in the form prescribed by the department, testifying to his services as a keeper or surfman of a life saving station, and giving other satisfactory evidence that he is entitled to treatment under the regulations. When it is impracticable to obtain the certificate, signed as above required, an affidavit of the applicant as to the facts of his employment may be accepted. The applicant must be required to sign his name to the certificate before it is signed by the officer granting it. The certificate must show that the applicant is borne upon the rolls of the life saving service at the time of making the application. Applicants who have been discharged from the life saving service, being no longer members thereof, will not be granted treatment. During the period when the life saving stations are open, sick or injured keepers and surfmen will be admitted to hospital or dispensary treatment according to the necessities of the case.

During the months when the stations are closed, sick or injured keepers and surfmen will be admitted as above, unless the sickness or injury is the result of employment not connected with the United States life saving service. If injured or taken sick during said months as a result of employment not connected with the life saving service, treatment will not be granted. Under the terms of the act a marine hospital will not be considered a home for sick or disabled keepers or surfmen of the life saving service. Temporary treatment alone is permitted, and no keeper or surfman will be retained in hospital longer than ninety days unless special authorization is given by the department.

Trial of the Second-class Battleship Maine.

The first official trial of the second-class battleship Maine occurred on Long Island sound on Wednesday last. The Maine was built at the Brooklyn navy yard and is of 6,648 tons displacement. Her engines, built by the Quintard Iron Works, were to develop 9,000 horse power, with a premium of $100 for each unit in excess of that power and a penalty of the same amount for each unit of deficiency. From unofficial reports, it would seem that there is no doubt of the builders earning a large premium. She made a run of twenty-five miles at an average speed of 15.95, or practically 16 knots per hour, and with a mean average allowance for tide, which was the last of the ebb at the final buoy, of about 1¼ knots, the result is 17.25 knots, a fine performance for a ship of the Maine's class—built to fight, not to run.

The Maine is supplied with a complete outfit of Blake pumps, including hydraulic pumps for working the guns, and also special independent combined air and circulating pumps for the main engines. These pumps are each supplied with two vertical single-acting air cylinders, 30 inches diameter; these being worked by means of a beam and links from 12-inch high and 24-inch low pressure horizontal steam cylinders connected directly to a 31-inch circulating cylinder. In addition to these, the outfit includes main and auxiliary feed pumps of the vertical duplex type, fire, bilge and engine room auxiliary pumps, etc.



CHICAGO DRAINAGE CANAL CANTILEVER CRANES, BUILT BY THE BROWN HOISTING MACHINE CO.

In General.

Secretary Carlisle has given notice that the title of the division of revenue marine, Treasury department, has been changed to "division of revenue cutter service."

A series of experiments is being conducted on board the first-class British battleship Revenge with a view to determine the precise advantage obtained by the new bilge keels which are being fitted to all the vessels of the Royal Sovereign class. At the first trial the vessel was given a degree of stability and steadiness by her double bottom being filled with water, and her bunkers with coal. The four barbette guns, each weighing 67 tons, were then trained at right angles, which gave the vessel a list of twelve and a-half degrees, and this was increased to fifteen when the crew were assembled on the side to which the guns were trained. It has been decided to subject the ship to a far more severe test, by removing both the coal and the water, and adopting the same method of carrying out the test. At the conclusion of the trials the Revenge will be docked, and bilge keels affixed to her bottom, and she will then undergo the same experiments as before.

Illustrated Patent Record.

SELECTED ABSTRACTS OF SPECIFICATIONS OF A MARINE NATURE—FROM LATEST PATENT OFFICE REPORTS.

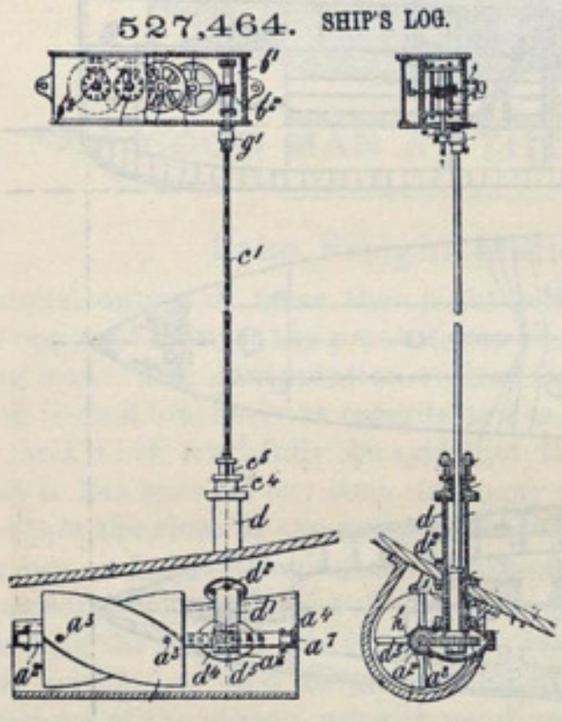
527,464. **SHIP'S LOG.** George Thom, Dunedin, New Zealand. Filed March 22, 1894. Serial No. 504, 713.

Claim.—In an apparatus for indicating the distance traveled by steam and sailing vessels the combination with the rotator, the shaft c' extending therefrom, the indicator mechanism, the said shaft c' having a cone friction gear g' at its upper end which uppper end is guided to move laterally in the indicator case, the shaft g^3 extending from the indicator mechanism parallel with the shaft c', the driving disk g^2 adjustable along the shaft and the means for holding the upper end of the shaft c' inwardly to press the friction wheel g' against the driving disk.

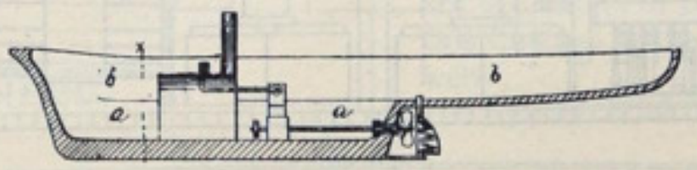
527,657. **HULL FOR VESSELS.** Gilbert T. Brewer, Hoboken, N. J. Filed Feb. 2, 1892. Serial No. 420,028.

Claim.—The hull of a vessel comprising the short narrow deep-draft lower section and the superimposed long wide shallow section joined one upon another, the excess of the length of the upper section forming a plain-bottomed overhang at the stern of the lower section and the excess of the breadth of the upper section likewise overhanging the sides of the lower section.

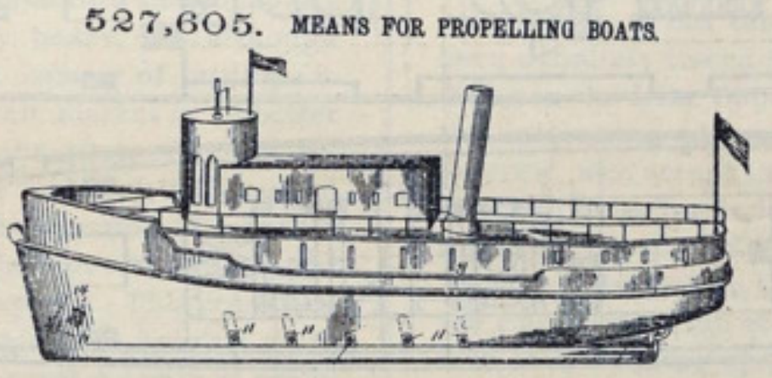
527,464. SHIP'S LOG.



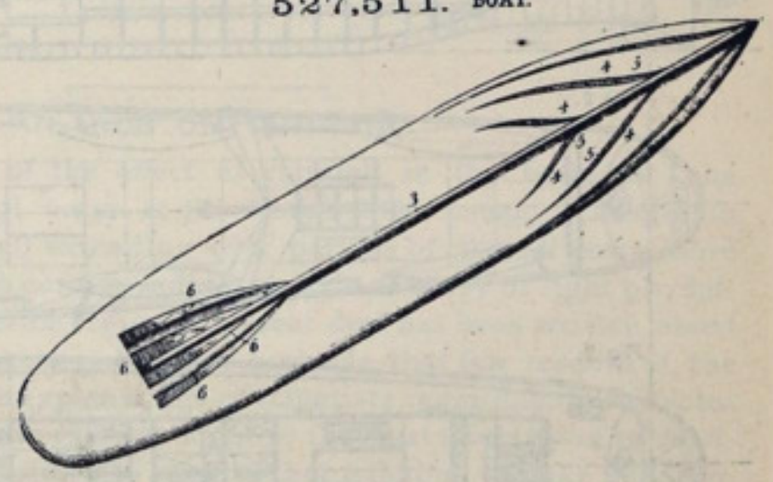
527,657. HULL FOR VESSELS.



527,605. MEANS FOR PROPELLING BOATS.



527,511. BOAT.



527,605. **MEANS FOR PROPELLING BOATS.** Pattillo Higgins, Beaumont, Tex. Filed Oct. 2, 1893. Serial No. 487,221.

Claim.—The combination with a boat of a head fastened to the counter thereof, and tapering from front and rear to bring it about on a level with the bottom of the boat, the rear end of the head being concaved and provided with a cap, a pipe connected with an air resevoir and terminating opposite the said concaved end of the head.

527,511. **BOAT.** George Rooke, Emporia, Kan. Filed Jan. 16, 1893. Renewed March 8, 1894. Serial No. 502,921.

Claim.—A hull provided with a series of steps at its bow converging from the keel of the boat towards its stern and toward a line parallel with the keel and a series of steps at its stern, the corresponding steps upon opposite sides converging toward the bow and to the keel, both series of steps, at the bow and stern, being preferably curved.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on Oct. 20, 1894:

	Wheat, bu.	Corn, bu.
Chicago	25,316,000	1,525,000
Duluth	4,223,000	.....
Milwaukee	741,000	.....
Detroit	1,532,000	9,000
Toledo	3,401,000	4,000
Buffalo	2,989,000	342,000
Total	38,202,000	1,880,000

At the points named there is a net increase for the week of 1,319,000 bushels of wheat, and a net decrease of 106,000 bushels of corn.

Notes from Naval War College Lectures.

When the compound engine was introduced on a practical scale about twenty-five years ago, many engineers of great ability contended that it was simply a fad of certain firms, and that single-cylinder engines with the same degree of expansion would run just as successfully and economically. So strong was this idea that many firms continued to build simple engines long after the success of the compound engine had been thoroughly demonstrated, and one steamship line even went so far as to engine two identical ships with the two kinds of machinery to determine by crucial test whether the compound engine really was the necessity that others claimed.

In the old days it was usually the custom to purchase material from reliable makers and assume that it was all right and had certain strengths. At the present time we assume nothing, but test everything and so know exactly what we are doing. In my first acquaintance with the designs for naval boilers, some fifteen years ago, a factor of safety as great as eight was used in calculating the strength of boiler shells. At the present time a factor of safety greater than four and a half is never used for naval boilers and sometimes it is as low a four. A similar reduction of the factor of safety holds for all those portions of the machinery where we are able to assure ourselves absolutely of the quality and strength of the material.—W. M. McFarland, passed assistant engineer, U. S. N.

Regarding the Life of Ericsson.

In Cassier's Magizine, for November, Col. Wm. C. Church, editor of the Army and Navy Journal, writes of "John Ericsson, the Engineer." Special interest is attached to what Col. Church says, because of the fact that it was the expressed wish of Capt. Ericsson that his biography should be prepared by Col. Church, if at all, and in the twelve or fifteen thousand letters and manuscripts left by him and transferred to the author of this article by his executors was found abundant material for something much more voluminous even than is there given. The article, which is to be continued in a succeeding issue, makes Ericsson known to the world as he was known to his friends. Several of his portraits, taken at different times of his life, accompany the article, and a number of other illustrations are given, showing Ericsson's early home and birthplace and some of the engineering works with which he was identified. The November number of Casier's also contains a short article on 'English and American Ship Building" by Mr. J. S. Jeans, who is well kown in England as a writer on engineering subjects.

Notices to Mariners.

Range lights at the mouth of the Kaministiquia river are each being raised 10 feet, to make them more conspicuous and lift them above the land fogs.

The red spar buoy marking the Pensaukee shoal which extends in a southeasterly direction from the land, between the Oconto and Pensaukee rivers, Green bay, has been discontinued.

Capt. Holdridge of the steamer A. D. Thompson reports to the hydrographic office that last fall he struck a reef of boulders of small extent, on the following bearings: Detour light just open from Fair island and distant 9 statute miles. A double point on Drummond island, bearing about northeast by north. Least water found between boulders was 7 fathoms, and least water on boulders 10 feet.

No less than seventy-five elegant engravings, made from photographs of the finest exhibits, statuary and attractive scenes in the mines and mining and fisheries buildings of the world's fair, are contained in part 13 of the "Book of the Fair." In addition there are several elegant large pictures of buildings and scenes throughout the exposition grounds. The high grade of art in engravings that characterized the first parts of this work is maintained in all of the late numbers.

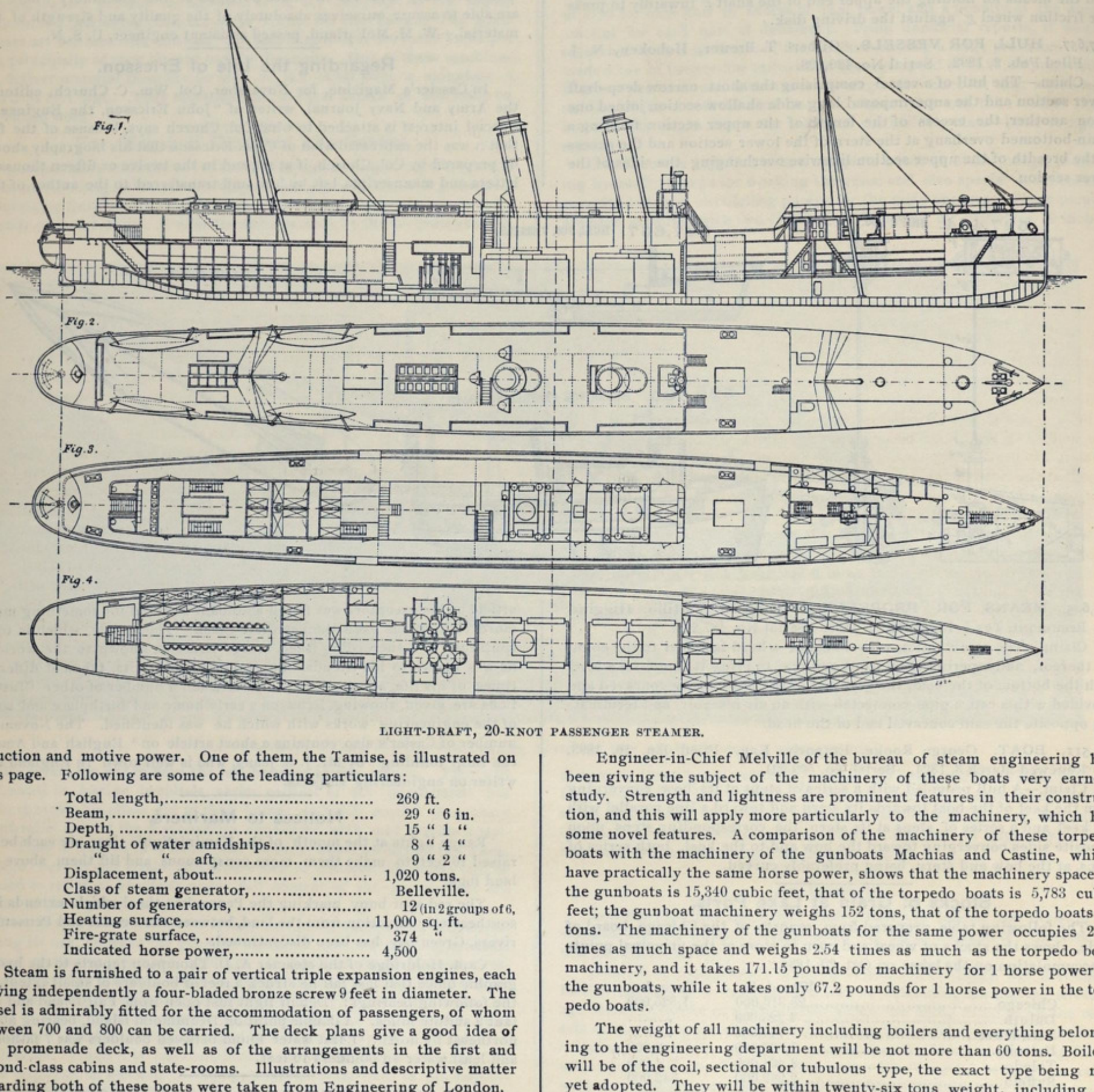
The improved high duty pumping engine made by the Geo. F. Blake Manufacturing Company has been selected for waterworks at Honolulu, the class being of the high speed automatic cut-off type. The machinery is now in course of construction at the East Cambridge works of the Blake company.

Another Light-Draft, 20-Knot Screw Steamer.

In our issue of the 4th inst. we described the twin-screw steamer Seaford, built by Wm. Denny & Bros. of Dumbarton, Scotland, for the channel service between Newhaven and Dieppe, in connection with the London, Brighton & South Coast Railway and the Western Railway of France. As these channel boats—there are three of them of 20-knot speed—are of light draft and are built for short runs, they would seem to embody features that might well be applied to passenger or excursion business on the lakes. The two built in France are named La Tamise and Seine, and they differ from the Clyde-built boat in certain features of construction and motive power. One of them, the Tamise, is illustrated on this page. Following are some of the leading particulars:

Total length,	269 ft.
Beam,	29 " 6 in.
Depth,	15 " 1 "
Draught of water amidships	8 " 4 "
" " aft,	9 " 2 "
Displacement, about	1,020 tons.
Class of steam generator,	Belleville.
Number of generators,	12 (in 2 groups of 6,
Heating surface,	11,000 sq. ft.
Fire-grate surface,	374 "
Indicated horse power,	4,500

Steam is furnished to a pair of vertical triple expansion engines, each driving independently a four-bladed bronze screw 9 feet in diameter. The vessel is admirably fitted for the accommodation of passengers, of whom between 700 and 800 can be carried. The deck plans give a good idea of the promenade deck, as well as of the arrangements in the first and second-class cabins and state-rooms. Illustrations and descriptive matter regarding both of these boats were taken from Engineering of London.



LIGHT-DRAFT, 20-KNOT PASSENGER STEAMER.

Three New Torpedo Boats.

Plans for both hulls and machinery of the three new torpedo boats are now about ready to be given out by the navy department. These are vessels that might well be constructed on the lakes, if there is any way of overcoming treaty restrictions. Two classes of bids will be received—one upon plans prepared by the department and the other upon plans prepared by the bidders. The amount of money available for each boat is $150,000, which is $37,000 more than the contract price of the Ericsson ($133,000). The provisions of the naval act authorizing the new boats require payment out of the appropriation for not only the bare hull and machinery, but outfit and armament. A speed premium of $1,500 will be allowed for each quarter knot in excess of the 24½ required, up to 25½ knots; and $2,000 for each quarter knot in excess of 25½ knots.

The general characteristics of the three vessels are: Length, 160 feet; beam, 16 feet; mean draught, 5 feet; displacement, 135 tons; indicated horse power, 2,000; speed, 24½ knots; armament, three single deck torpedo guns and three 1-pounder rapid fire guns. Each will carry four automobile torpedoes and 1,800 rounds of 1-pounder ammunition. There are to be accommodations for four officers, twelve men and four machinists, and the coal capacity is to be forty-five tons.

Engineer-in-Chief Melville of the bureau of steam engineering has been giving the subject of the machinery of these boats very earnest study. Strength and lightness are prominent features in their construction, and this will apply more particularly to the machinery, which has some novel features. A comparison of the machinery of these torpedo boats with the machinery of the gunboats Machias and Castine, which have practically the same horse power, shows that the machinery space of the gunboats is 15,340 cubic feet, that of the torpedo boats is 5,783 cubic feet; the gunboat machinery weighs 152 tons, that of the torpedo boats 60 tons. The machinery of the gunboats for the same power occupies 2.65 times as much space and weighs 2.54 times as much as the torpedo boat machinery, and it takes 171.15 pounds of machinery for 1 horse power in the gunboats, while it takes only 67.2 pounds for 1 horse power in the torpedo boats.

The weight of all machinery including boilers and everything belonging to the engineering department will be not more than 60 tons. Boilers will be of the coil, sectional or tubulous type, the exact type being not yet adopted. They will be within twenty-six tons weight, including all the attachments, and will have a heating surface of 5,120 and grate surface of 95 square feet. Each boiler will have its own water-tight compartment, as will also each engine. The engines, of the triple expansion, condensing type, will be vertical and inverted and will have four cylinders each, the high pressure of 12 inches diameter, intermediate 10¼, and each low pressure 22 inches, with 16 inches stroke.

P. M. Church of Sault Ste. Marie has placed lamps on six or eight ranges in Hay lake channel, and will undertake, on his own account, the expense of maintaining them until the close of navigation. This voluntary service is certainly worthy of appreciation from the vessel interests.

A GOOD MAN AT THE WHEEL.

Lake Freight Matters.

An annual output of more than eight million tons of Bessemer ore would be required to meet the present rate of manufacture and consumption of pig iron. The consumption of iron is very heavy, and although everything is on a low basis as regards prices, the volume of business is immense, and it can truthfully be said that the iron market is in better shape than it has been at any time for many months past. Ore dealers agree also that the close of the present season will find very little unsold Bessemer ore on Lake Erie docks. Of course, the question of whether furnace owners have bought sufficient ore for their needs will depend upon how long the present rate of consumption keeps up. This condition of the iron market has been the great factor in keeping ore freights up to the best figures of the season, notwithstanding the great scarcity of grain. There is still a demand for ore vessels from the head of Lake Superior at 90 cents, but little prospect of a higher rate for the last month of the season unless a movement of grain sets in. Milwaukee shippers of soft coal are a little pressed for boats, on account of the improved rates being paid on hard coal out of Buffalo, and they may have to pay better than 50 cents on cargoes yet to go forward.

Wire Rigging.

The loss of the schooner Alva Bradley has set a veteran observer along the docks to bringing up interesting reminiscences. Shifting his quid and giving a nautical hitch to his garments, he proceeds to say that Capt. "Ned" McGeehan came to the lakes from Brooklyn navy yard about 1871 with a gang of wire riggers to fit out the Bradley. No other craft on the upper lakes then boasted metal shrouds, and many were the prognostications, on the part of the wise old heads, as to coming disaster in a storm. Her rigging was cut to lengths in an importing house on Broadway and cost a handsome price in gold, which was then at a premium.

After he had fitted out the Bradley, Captain George Stone persuaded McGeehan to go as his first mate, which he was well qualified to do. At the close of the season he entered the employ of Upson & Walton, then a rising firm of young men, who were wide enough awake to see that the days of hemp rigging were numbered. At first they felt their way cautiously, importing in small quantities as the demand seemed to indicate, but their trade grew, until at the end of a score of years over a thousand miles of wire rope, of one size or another, had passed through their hands. At first it was deemed necessary to give the standing rigging a spring by means of hemp lanyards, but later on these were replaced by rigid turn-buckles. At length came the whaleback style of vessels which discard both hemp and wire rigging. The old sailors mourn the graceful spars of the fore-and-aft rigged schooners.

McGeehan senior has gone over to the majority, but his son is a valued member of the old firm.

Another Letter from Mr. Joy.

Editor of the MARINE REVIEW.—In my last communication to your paper (enclosing letter from Mr. Gordon H. Nott, an expert engineer) it was proved conclusively that by the proposed Chicago drainage canal the level of the great lakes would be lowered anywhere from five to eighteen inches. The most conservative figures by the government engineers admit that the level will be lowered about five inches and possibly more, but Mr. Nott and others equally well versed in such matters, are certain that a flow of "not less" than 600,000 cubic feet per minute will seriously affect the level of the lakes, and whatever affects the level of the lakes affects the commerce of these lakes, and thus the welfare of the whole people of the northwest. The government is at the present time spending millions of money in deepening the connecting channels of these most important waterways, and are all the efforts of congress to secure cheaper transportation for our people to be neutralized by this Chicago canal? Can not some other method be devised by which the sewage of Chicago may be disposed of without affecting the vast and most important commerce of these waters? Would it not be well, instead of draining the sewage of Chicago into the Chicago river and cause its waters to flow back into the Illinois river and away from the lake by means of the drainage canal, to cause the sewage to flow into large underground sewers running underneath the city, these sewers in turn connecting with an underground tunnel running from Chicago to about three miles below Joliet, allowing sufficient water only into these sewers to flush them.

In a pamphlet prepared on this subject, Mr. Nott shows that such a plan is possible, and if such a plan is possible, it is the duty of the government in Washington to stop this drainage canal scheme, which surely will affect our lake commerce and the commercial interests of the people of the whole northwest. It is indeed time for the government to take a hand in the matter. Will the cities along the chain of lakes stand by and see the waters in their harbors lowered 18 inches, and perhaps more, by this Chicago channel, when another system of sewerage would answer as well?

RICHARD P. JOY.

Detroit, Mich., Oct. 24.

An Inch of Rain-fall.

Everybody knows of the effect of rain-fall in the basin of Lake Superior on the draft of water at St. Mary's Falls canal. Changes in water levels at the canal, extending over periods of several years, have been definitely traced to corresponding periods of heavy or light precipitation in the Lake Superior region. A great deal has been written about this interesting phenomenon, but it is probable that few readers of the REVIEW, who accept the explanations of scientists regarding these fluctuations in water levels, have given thought to the great quantity of rain falling in an expanse of territory so large as that tributary to Lake Superior. Some calculations on the weight of rain, made by John Birkinbine before the Engineers' Club of Philadelphia, may be applied to lake surfaces. One inch of rain falling upon an area of one square mile is equivalent to 2,323,200 cubic feet, or nearly 17,500,000 gallons, and this quantity of water will weigh 145,200,000 pounds, or 72,600 short tons. If one inch of rain fell over the entire surface area of Lake Superior, 31,200 square miles, the quantity of water which would be precipitated would be represented by 546 billion gallons or 2,265,120,000 net tons. An inch of rain-fall over the surface of all five of the great lakes, 95,315 square miles, would be equal, according to similar calculation, to nearly seven billion short tons. But, of course, this is simply a collection of figures having no regard for evaporation and referring only to lake surfaces, and not the great lake basins with their thousands of rivers and small streams.

Support from the Light-House Board.

Officers of the Lake Carriers' Association who were in Washington during the early part of the week, looking after matters pertaining to the program for new lights and other aids to navigation, mapped out some time ago, are highly pleased with their reception at the hands of Naval Secretary Wild of the light-house board. Nearly all of the aids sought by the vessel owners have already been urgently recommended by the district engineers, and such of them as have not been so recommended will be considered as soon as Secretary Keep of the association furnishes the board with more detail regarding the necessity of them. It is probable that for places like Poverty passage and the shoal north of Squaw island, Lake Michigan, gas buoys will be secured.

In compliance with the terms of the last river and harbor act, the president has appointed a board to examine and determine, from the surveys heretofore made under the war department, the most feasible route for the construction of a waterway to connect Chesapeake bay and the Delaware river, which, in its judgment, should give the greatest facility to commerce and will be best adapted for national defense. The appointees are: Gen. Thomas L. Casey, chief of engineers of the army; Col. William P. Craighill, United States engineer corps; Capt. George Dewey, United States navy, member of the light-house board; Mr. Mendes Cohen of Baltimore, late president of the American Society of Civil Engineers, and Mr. J. Alexander Porter of Savannah, Ga., civil engineer of wide reputation and a capitalist.

MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O.

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The books of the United States treasury department contain the names of 3,341 vessels, of 1,227,400.72 gross tons register in the lake trade. The lakes have more steam vessels of 1,000 to 2,500 tons than the combined ownership of this class of vessels in all other sections of the country. The number of steam vessels of 1,000 to 2,500 tons on the lakes on June 30, 1894, was 318 and their aggregate gross tonnage 525,778.57; in all other parts of the country the number of this class of vessels was, on the same date, 211 and their gross tonnage 314,016.65. The classification of the entire lake fleet on June 30, 1894, was as follows:

Class.	Number.	Gross Tonnage.
Steam vessels	1,731	843,239.65
Sailing vessels	1,139	302,985.31
Canal boats	386	41,961.25
Barges	85	39,214.51
Total	3,341	1,227,400.72

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
Year ending June 30, 1889	225	107,080.30
" " " 1890	218	108,515.00
" " " 1891	204	111,856.45
" " " 1892	169	45,168.98
" " " 1893	175	99,271.24
Total	991	471,891.97

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

	St. Mary's Falls Canal.			Suez Canal.		
	1893.	1892.	1891.	1893.	1892.	1891.
No. vessel passages	12,008	12,580	10,191	3,341	3,559	4,207
Ton'ge, net regist'd	9,849,754	10,647,203	8,400,685	7,659,068	7,712,028	8,698,777
Days of Navigation	219	223	225	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

WHEN THE type of lake vessels known as canal schooners were first built on the lakes, serious doubts were entertained by experienced builders and owners regarding their stability. The proportion of depth—restricted on account of Welland canal draft of the time—to that of length and breadth, was not sufficient to insure stability under all conditions of loading. But these vessels were well built, and in some regards the disproportion in dimensions was partly counteracted by other strong features of construction. Then, too, repairs were kept up well in the days when there was a profit in such vessels, and the depth of water through channels and harbors traversed by the trade in which they were engaged was not sufficient to permit of overloading. These conditions have since changed and the canal vessels have grown old. They really have no place in the lake business now, as far as profitable operation of them is concerned, and there is no doubt of the loss of another batch of them this season being due in nearly all cases to overloading and age without sufficient repairs. There may be an exception or two, as in the case of the schooner Home, which foundered on Lake Michigan, on account of her deck load of pig iron being moved around in heavy seaway, but the conclusions here drawn are plain.

"WHO WILL be the next president of the Lake Carriers' Association?" is a question that has been asked several times in vessel circles of late. The time for the fourth annual meeting of the reorganized association is drawing near, and it is probable that unusual interest will attend the election of a new president, as it is understood that Detroit owners will make an effort to secure the place for one of their number. Three Cleveland owners, Mr. M. A. Bradley, Capt. Thomas Wilson and Mr. James Corrigan, have presided over the affairs of the association up to this time, and the place could undoubtedly be well filled by any of several other large owners in Cleveland, but while the constitution provides that executive officers of the association shall have headquarters in Cleveland, there is nothing to prevent the selection of a president from any other lake city, and it is especially provided that there shall be no reelection to the office of president. With these points in view, both Capt. E. M. Peck and W. A. Livingstone of Detroit have been referred to as possible candidates for the office. Either of the gentlemen would do honor to the position.

MEN LIKE the late Alva Bradley and Capt. Thomas Wilson of Cleveland, Capt. E. M. Peck of Detroit, and many others who might be mentioned, made money in lake trade by remaining in the vessel business through good and bad seasons. Periods of depression, caused almost entirely by an overproduction of ships, have occurred in the past, and in some cases the lowering of freights, in proportion to the earning qualities of the vessels, was even more marked than it is at present. But the men who stuck to the business, through high and low freights, were most successful, as they were in a position to take immediate advantage of profitable carrying charges when the same were offered. There is no doubt of history repeating itself in this regard with owners who tide over the present or possibly another season. Margins may not be so great, and the investments required may be much larger than they have been in time past, but the rule will hold good just the same.

FOR A year or more past newspapers in all parts of the lakes have been giving space to plans of a mysterious Detroit "syndicate," whose promoters talked of paralelling the Detroit and St. Clair rivers with a canal through Canada from Lake St. Clair to Lake Erie. The canal was to shorten the distance between the two lakes by 140 miles, but it did not occur to the advocates of the scheme, until they secured a report, a few days ago, from an engineer, that large vessels would require as much if not more time in making the passage of the artificial waterway as is now required in running the longer route through the rivers. At a low estimate the canal would cost $15,000,000, and the only possible argument that might be advanced in favor of it was that of a saving in time. It has been well said that nothing is freer than canal schemes these days.

IN CONNECTION with reports of the construction of an aluminum torpedo boat on the Clyde, several of the English technical journals have given considerable attention to a new steel making process, by means of which, it is claimed, certain Sheffield manufacturers have been able to produce steel having a tensile strength of from 50 to 60 tons per square inch, and of such ductility that it can be punched, sheared or otherwise manipulated with as great ease as ordinary steel plates. With steel of this quality, it would be possible to construct a vessel of much greater strength than an aluminum vessel, and which would be lighter and of much less cost. The attention that is given to the experiments at Sheffield would seem to indicate prospects of early success with the new steel process.

IN A LETTER to the REVIEW, Mr. Eugene T. Chamberlain, United States commissioner of navigation, says that it will be impracticable to obtain a ruling by the courts, as to whether the new rules to prevent collision at sea are applicable on the lakes, until the time comes for them to go into effect. These rules, which make quite a number of changes in existing regulations, are the result of recommendations of the International Marine Conference, and in accordance with the proclamation of the president, issued some time ago, will go into effect in May next. There is a difference of opinion as to whether they will apply to lake navigation, on account of a peculiar wording of the law. This matter would seem to warrant attention from the Lake Carriers' or Shipmasters' Associations.

IF MR. RICHARD P. JOY of Detroit is prompted by patriotism alone in his writings favorable to protection for American shipping—and we have no reason to hold an opinion at all to the contrary—he is certainly deserving of the gratitude of shipping interests throughout the country. Mr. Joy has just issued two more pamphlets containing extracts from newspapers and copies of letters on the shipping question.

The Steamer Great Britain.

Editor MARINE REVIEW:—At first I hesitated to call attention to the article in THE REVIEW of Sept. 6, relating to the steamship Great Britain, owing to the fact, as stated, that I knew nothing personally of the first engines placed in the ship, my engineering experience not having commenced until the fifties, at which time there were a number of screw steamers on the Atlantic and still more in the Mediterranean trade. I am, however, pleased with the result of my communication, as it has brought out from Mr. Stevens and Mr. Kirby some facts relating to the first engines, together with other information regarding a successful ship. Among the former, I notice Mr. Stevens states that there were in the first engines four 88-inch cylinders, instead of "a pair," as stated in your issue of Sept. 6.

R. Chestnut.

Oswego, N. Y., Oct. 17, 1894.

Nabor Soliani, one of the foremost of Italian naval engineers, and who will be remembered as one of the leading foreign representatives at the engineering congress held in connection with the world's fair, has written an article on water tube boilers for the Rome Rivesta Marittima, which has attracted a great deal of attention. He expresses the opinion that the future of the water tube boiler is now well assured. The Belleville, he says, is admitfedly superior for large ships but some other varieties are better suited to torpedo boats and other small craft.

Water Tube vs. Cylindrical Boilers.

James Howden, inventor of the Howden hot draft system, which has been applied to a number of steamers on the lakes, and for which the Detroit Dry Dock Company holds the agency here, has just issued to the manufacturers of the Belleville water tube boiler in England a challenge that will attract attention among marine and naval engineers in all parts of the world. Mr. Howden has held that the high power attainable from boilers worked on his system arises, in great part, from their higher economy, and that the weight of boilers with his system is increased very slightly by increasing their economy. These are the points he wishes to prove in proposing the practical tests. He selects the Belleville boiler as the only water tube boiler that has been sufficiently proved in working continuously at sea, and as evidence of earnestness in the matter he suggests, in event of the makers of the Belleville boilers declining the challenge, that it be taken up by some public body interested in the important question at issue. The challenge was occasioned by a lengthy correspondence that has followed the reading of a paper on the "Comparative Merits of Cylindrical and Water Tube Boilers for Ocean Service," by Mr. Howden at the last meeting of the Institution of Naval Architects. It appears in the Oct. 12 issue of Engineering of London. Mr. Howden says:

"The important feature of durability cannot, of course be tested in a few days' trial, but as regards weight, space occupied, evaporative power and economy, also heat wasted, the proposed trials will afford a fair comparison. I do not admit that a single Belleville boiler could run continuously at sea, as all the evidence is to the contrary, for it appears it is only when the power is sufficiently large to permit of a considerable number of boilers being used, so that one or more may be put under repair at sea, that they can maintain the engines running continuously on long voyages. Waiving, however, the question of the durability of the Belleville boiler, I take, for the purposes of the proposed trials, this boiler as constructed for the Messageries Australian steamers, as a water tube boiler capable of working in ocean steamships. It has been claimed by the makers of these boilers in this country that, for a given power, they are much lighter, occupy much less space, and are otherwise superior to cylindrical boilers. If the makers of the Belleville boilers, believing in their superiority, will provide two boilers for trial, of the same size and construction as those used in French mail steamers, I undertake to supply a single-ended cylindrical boiler, with two furnaces having the proportions of grate and heating surface to trial indicated horse power, as those of the four installations of cylindrical boilers with my forced draught given in a previous communication, to be tested in competition with the two Belleville boilers on the points of weight and space occupied for a given power, and evaporative power and economy.

"The Belleville boilers in the Australian steamships are stated to give each 250 indicated horse power, with ease, in working at sea and 400 indicated horse power on trial, the heating surface being 1,190 square feet and the grate surface 29 square feet, which for two boilers is 2,380 and 58 square feet for heating and grate surface respectively, and 500 and 800 for sea and trial indicated horse power. The average heating surface, per trial indicated horse power, of the four installations of cylindrical boilers given in the communication referred to, is 1.67 square feet, and the average indicated horse power, per square foot of grate is 23. These averages on 800 indicated horse power give the respective heating and grate surfaces of the cylindrical boiler I offer to construct and put in competition with the Belleville boilers as 1,336 and 37.78 square feet against 2,380 and 58 square feet respectively for the Belleville boilers. The following conditions are submitted as a basis on which the competition could be impartially carried out:

"1. The trials to be under the direction of neutral experts, such as the research committee of the Institution of Mechanical Engineers, or other experts mutually approved of.

"2. For convenience, as well as accuracy, the boilers to be tested for power and economy by water evaporation, the weight of water per indicated horse power to be, say, 14 pounds from 60 degrees Fahr.

"3. Two trials to be taken, each of 30 hours' continuous working. One of the trials to be at an evaporative rate equal to 500 indicated horse power, and the second equal to 800 indicated horse power.

"4. The weights of the respective boilers to be taken as follows: Both boilers to rest on a plain level floor. All parts of the boilers above this level floor to be included in their respective weights. The water tube boilers to have the same thickness and dimensions of tubes and other parts of their structure under pressure as the boilers now working on board the Australian steamships, also the brick work in furnaces, and the casing surrounding the boilers, to be of the same thickness and character, so that the trial may be made with boilers suitable for working at sea, and not boilers got up for a few days' trial. The cylindrical boiler, likewise, to be made to board of trade, Lloyds', or British corporation rules, for 165 pounds working pressure, and to receive certificate for this pressure, so as to insure its being an ordinary mercantile boiler, and not one built of lighter scantling, such as the admiralty boilers. The non-conducting composition on the cylindrical boiler to be covered outside with sheet iron, including the back end. The smokebox doors and air reservoirs to be covered in the usual manner of forced draught boilers. The weight of fan and engine, and all forced draught apparatus, to be included in the weight of the cylindrical boiler, also the funnels, uptakes, and mountings in both boilers. The funnels to be made of a thickness proportioned to their height and diameter.

"5. As the cylindrical boiler is single-ended, with two furnaces, the heaviest form of this kind of boiler, the two Belleville boilers to be placed alongside each other and worked as single-ended boilers also; not back to back like a double-ended boiler. In order to insure the equal protection of both boilers from escape of heat from their respective coverings, the escape of heat from the covering to be one of the points of comparison to be tested.

"6. All the other conditions necessary to secure an impartial trial to be mutually arranged and to be supervised in carrying out by the neutral experts in charge of the trials. As the cylindrical boiler would be too large to be conveyed by rail, while the water tube boilers can be easily conveyed in pieces, the trials to be made in Glasgow or neighborhood. I would be prepared to make a certain compensation on this account.

"7. Each competitor to pay one-half of the trial expenses (which do not include the cost of the boilers or their erection), if the results of competition are considered equal; but if the water tube boiler is found superior on the aggregate of all the points of trial by even 1 per cent., I undertake to pay the whole of the trial expenses; while, on the other hand, to show my confidence in the single cylindrical boiler being more powerful and much more economical than the two Belleville boilers, I will not claim payment of my share of the trial expenses until the aggregate superiority of the cylindrical boiler is, on the points at issue, not less than 20 per cent. better than the water tube boiler. The percentages to be taken on the mean of the higher and lower ratings.

"As my object in proposing these trials is to give undoubted proof of the great superiority of the cylindrical boiler, in regard to power and economy of fuel when properly worked, and to show also its superiority for ships of war, I undertake to restrict the heating surface of the air-heating tubes in the competitive boiler to one-fith of the heating surface of the boiler, instead of the much larger proportion of air-heating surface now used by me, as in some warships room for a large air-heating is not always available. The cylindrical boiler proposed for this trial would, therefore, have no special proportions for securing economy. This challenge, under conditions which purposely handicap the cylindrical boiler in the trials proposed, and which I leave open for acceptance for six weeks after first publication in your columns, will, I trust, be accepted by the makers of the Belleville boiler in this country. I do not restrict the conditions of trial to the precise form here given. If the object sought for—a fair trial—can be attained by better methods, I am quite prepared to adopt these methods.

In conclusion, Mr. Howden claims that the Belleville boilers adopted by the British warships Powerful, and Terrible, will require from 20 to 35 per cent. more fuel than is required by cylindrical boilers for equal power. "This is surely a point of sufficient importance," he says, "to render the proposed trials of the utmost interest to the naval authorities. If they do not believe my estimate of the wastefulness of the water-tube boiler, and the greater economy and power of the cylindrical boiler when properly designed and worked, the proposed tests would be valuable in showing the differences in actual practice."

In the communication in which this challenge is issued, Mr. Howden refers also to Martin's induced draft. He says that the so-called "Martin's induced draft" might as well be referred to by any other name. It is nothing more or less than the Stevens fan-suction draft with the title "induced." This system was designed by the brothers E. S. and R. L. Stevens of New Jersey, and fitted by them to the steamers Passaic and Philadelphia in 1836 and 1838, but was ultimately abandoned by them for reasons which have led to its disuse in every case in which it has been applied to the boilers of steamships. As this system requires no machinery or boiler fittings further than the connection of the fan to the uptake and funnel, it is consequently exceedingly simple, and admits of no modifications or improvements. With the heated gases expanded into a large volume it requires proportionately large fan power to produce a rate of combustion greater than that attainable by natural draught, and this fan power, for obvious reasons, grows in a rapidly increasing ratio as the rate of combustion is increased. For a rate of combustion equal to that obtainable by chimney draught, this system is not only entirely superfluous, but wasteful, as all the cost of the fans and fittings, and the power used in driving the fan, in such a case is useless expenditure. Since the trials made by the brothers Stevens in America, this system has been tried at various times in different countries, but for the reasons mentioned has always been abandoned.

Cargo and Speed Records.—Lake Freight Steamers.

Iron ore.—S. S. Curry, Hawgood & Avery Transit Company of Cleveland, 4,569 gross or 5,117 net tons, Escanaba to South Chicago; Maritana, Minnesota Steamship Company of Cleveland, 4,260 gross or 4,771 net tons, Escanaba to South Chicago; Selwyn Eddy, Eddy Bros. of Bay City, Mich., 3,897 gross or 4,364 net tons, Escanaba to Ashtabula; Kearsarge, Interlake Company of Cleveland, 3,718 gross or 4,164 net tons, Escanaba to Cleveland.

Grain.—Selwyn Eddy, Eddy Transportation Company of Bay City, 130,820 bushels of wheat, Detroit to Buffalo; Centurion, Hopkins Steamship Company of St. Clair, Mich., 147,812 bushels of corn, Chicago to Erie; Onoko, Minch estate of Cleveland, 187,657 bushels oats, Chicago to Buffalo.

Coal.—S. S. Curry, Hawgood and Avery Transit Company of Cleveland, 4,535 net tons bituminous, Conneaut to Gladstone; Selwyn Eddy, Eddy Bros. of Bay City, Mich., 4,252 net tons anthracite, Buffalo to Milwaukee.

Speed.—Owego, Union Line of Buffalo, Buffalo to Chicago, 889 miles, 45 hours and 16 minutes, 16.4 miles an hour; Centurion, Hopkins Steamship Company of St. Clair, Mich., Buffalo to Duluth, 997 miles, 67 hours and 50 minutes, 14.7 miles an hour.

Around the Lakes.

John C. Spry has begun dock and warehouse improvements at Sault Ste. Marie that will cost $30,000.

At Traverse Bay, Lake Superior, Charles Hebard & Son are building a dock 1,500 feet long, for shipments from their extensive red stone quarry.

Duluth's life saving station on Franklin Square, Minnesota point, has been accepted from the contractors by the government, but it will not be manned until next spring.

John and Thomas Conlon of Thorold, Ont., have purchased the schooner F. L. Danforth for $12,500. The Conlons own the steamer Erin, which has been towing the Danforth.

A part of the bar at the entrance to Fairport harbor will be cut away immediately, and Col. Jared Smith, government engineer in charge, says the entrance will be entirely dredged out next spring.

Capt. John McCormick, who was in charge of the Chicago excursion steamer Ivanhoe during the summer, has been given command of the revenue cutter Calumet, which is about ready for service in Chicago harbor.

Capt. James Davidson has begun work on another boat at West Bay City—a wooden steamer of 306 feet keel. Engines will be triple expansion, 20, 33 and 54 by 42 inches, and will be built by the Frontier Iron Words of Detroit.

Five of the lock gates are hung in the Canadian Sault canal and dredges are at work removing the dams at both ends. Mr. Crawford, resident engineer, is quoted as still holding that vessels can be put through the canal if required this fall.

In going after and releasing the steamer Geo. L. Colwell and consort D. P. Dobbins after they had been pronounced total wrecks at Deer Park, Lake Superior, the Grummond Wrecking Company of Detroit accomplished a good job of wrecking.

Harbor improvements suited to the Conneaut-Port Dover car ferry service are said to be under way at Port Dover, but there is no announcement as yet of the ferry company securing money enough to go ahead with the construction of the boats.

War department officials charge that ashes from the steamer Owego were dumped into the St. Clair Flats canal. A bond has been given to the United States marshal at Detroit by the owners of the boat, and a hearing will be had in Detroit next month.

Contracts have been let by the Great Northern Transportation Company of Owen sound to the Collingwood Dry Dock Company for the wooden hull and to John Inglis & Son of Toronto for the machinery of their new boat. The boat will be built in the Collingwood company's dock. She will be 208 feet keel, 225 feet over all, 35 feet beam and 12 feet depth of hold.

Euclid Beach Park Company is the name of a corporation just organized in Cleveland to fit up a summer resort a few miles east of the city, and to run a couple of passengr boats along the lake front next season. It is proposed to buy or charter the boats. A. E. Thompson, Cleveland agent of the Crescent line of steamers. and J. R. Irwin of Fairport are named as stock holders.

The telephone line from the Sault to Detour has been purchased by T. C. Anthony of Detour, who has appointed as manager Thos. R. Harvey of the Sault. Offices have been established at Nine-Mile point, Hay lake, Neebish, and Sailors' encampment. There is no one in charge of the office at Neebish, which is at the lower end of the dyke, in a small building, but the telephone can be used at any time.

In his suit before a jury in the United States district court, Cleveland, against the Insurance Company of North America, H. J. Johnson of Cleveland recovered the full amount sued for, about $10,000, on account of the fire loss a year ago on the steamer V. Swain. Further litigation will undoubtedly follow, however, as the underwriters have been quite determined in the matter and are not disposed to settle.

Business men of Chicago have proposed to the city government that ten harbor tugs be supplied with pumps that will fit them for use as fire boats when they are needed for such service. It is proposed that the city shall pay the owners $300 a year for each tug so equipped, and in addition when in actual service at a fire, $20 for the first hour, $16 for each succeeding hour up to five hours, and $10 and hour thereafter.

Hingston & Woods of Buffalo have secured the contract for deepening the channel from Tonawanda to Niagara Falls. Major Ruffner, government engineer in charge, says that but for the International bridge, any vessel that can pass up Buffalo creek could go to Tonowanda, but the bridge is situated at the foot of a bad rapid, and the engineer holds that no captain will care to take a vessel of large size through the draw of the bridge as at present constructed.

The schooner Nelson Bloom, which was dismasted on Lake Michigan in one of the recent blows, was at one time the passenger steamer Meteor, which, while commanded by Capt. Thomas Wilson of Cleveland, met the steamer Pewabic in collision on Lake Huron. The Pewabic, commanded by Capt. George P. McKay, also of Cleveland, went down with a large number of people aboard, and with a valuable cargo of copper, which has since been sought several times by wreckers.

Secretary Keep of the Lake Carriers' Association informs us that he has received a request from Gen. Poe, United States engineer in charge of the improvements now going on at the foot of Lake Huron, asking that vessels shall pass between the two dredges now at work there. At present vessels pass between the red dredge and the light-ship. There is only 200 or 300 feet between them, and this course is not only dangerous to the passing vessels, but an obstruction to the work. There is a space of 1,600 feet between the two dredges where vessels may safely pass.

Following are some records of rapid loading of anthracite coal from pockets and chutes in Buffalo: On Aug. 7, the Delaware, Lacawanna & Western Coal Company loaded from pockets to vessel, 3,813 gross tons in three and three-fourths hours. The Philadelphia and Reading Coal Company, at their trestle, have loaded 10,300 tons of on six steamers in ten hours, besides fueling part of them. The steamer Alfred P. Wright has frequently taken 2,400 tons in one and one-half hours at the Delaware, Lackawanna & Western chutes, and the steamer John B. Lyon 2,200 tons in the same time.

Trade Notes.

Wheeler & Co. of West Bay City, Mich., will build a triple expansion engine for the steam yacht Restless. Cylinders will be 13, 19 anna 32 inches in diameter and the stroke 16 inches.

A propeller wheel for the whaleback steamer Everett, on which work has been resumed at Everett, Wash., was shipped a few days ago from the Frontier Iron Works, Detroit. The wheel was taken to Duluth on the steamer Thomas Wilson and will go to the coast over the Northern Pacific Railway.

Director Hyman and other officers of the Cleveland fire department are more than pleased with the steel fire boat hull constructed for the city by the Union Dry Dock Company of Buffalo. The boat was towed from Buffalo to Cleveland Saturday and preparations were made immediately for installing her machinery,

Only one of the Cleveland & Buffalo Transit Company's side-wheel steamers, the State of Ohio, will be retained on the route between Cleveland and Buffalo for the balance of the season. The Ohio will depart from Cleveland Mondays, Wednesday and Fridays at 6:15 p. m., standard, and from Buffalo Tuesdays, Thursdays and Saturdays at 7:15 p. m., eastern time.

Building operations have been entirely suspended at the ship yard of the Globe Iron Works Company, and it would seem that notwithstanding all statements to the contrary, President Hill of the Great Northern Railway is not disposed to order a resumption of work on the passenger steamer North Land early enough to permit of her going into service next season. Although the fact is not generally known, it was Mr. Forbes of Boston, owner of the yacht Wild Duck, who urged Mr. Hill to put Belleville boilers into the North West. Mr. Forbes is a heavy stock holder in the Great Northern Railway. His yacht Wild Duck is fitted with Belleville boilers.

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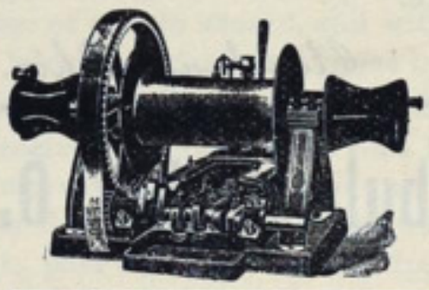

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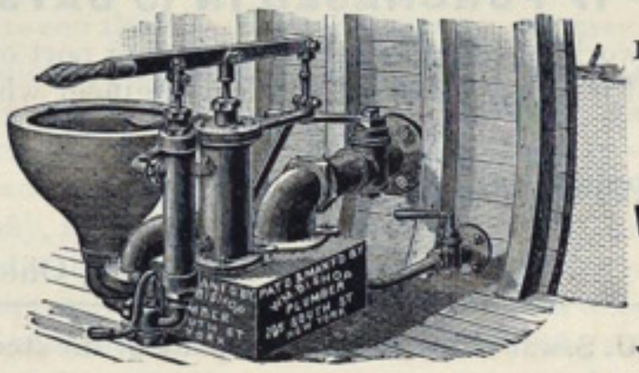

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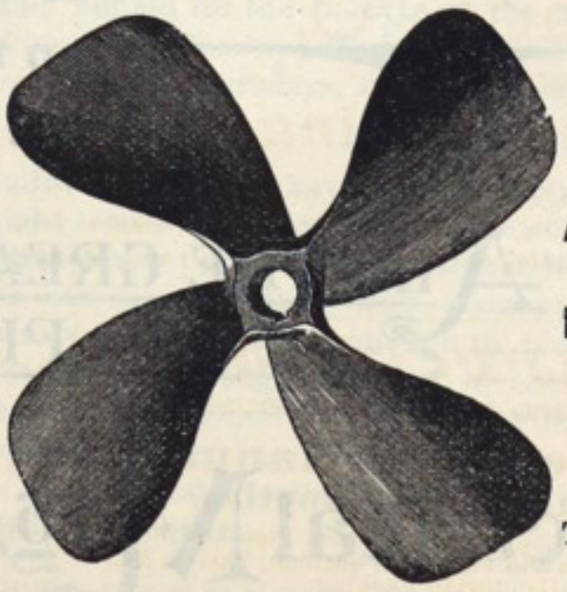

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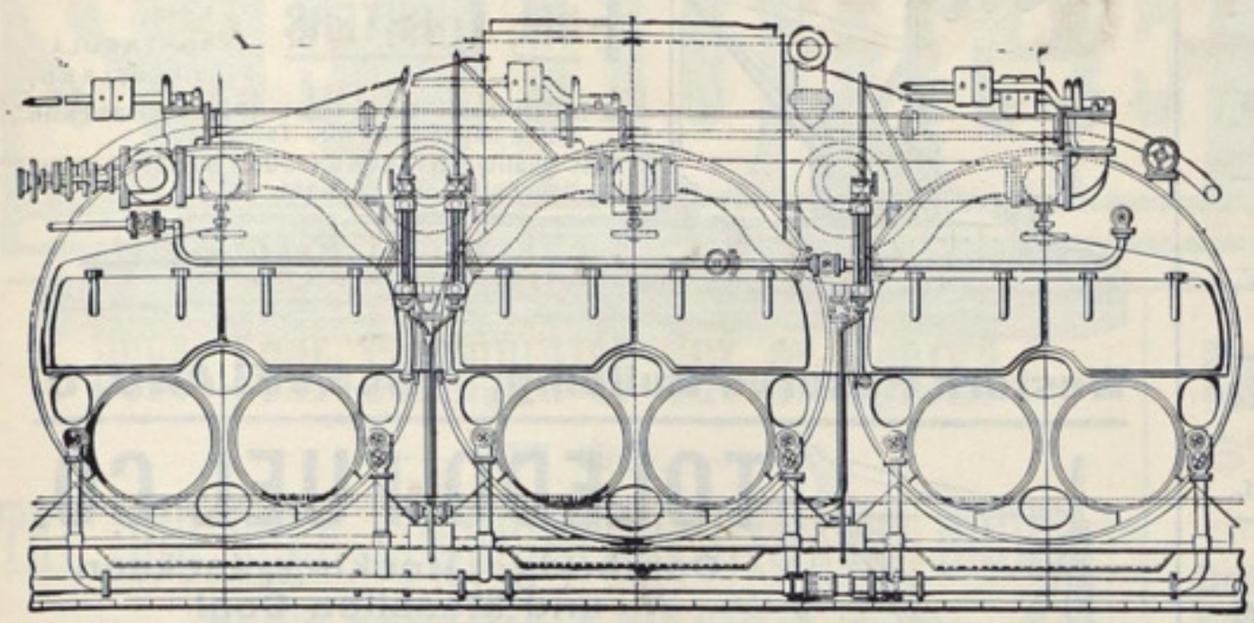

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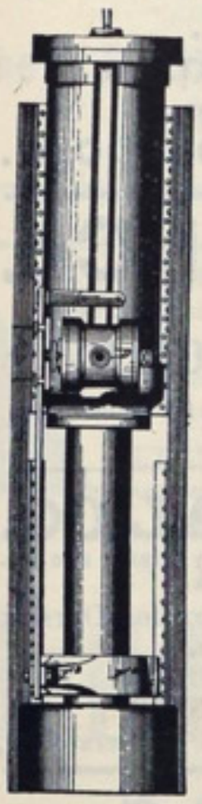

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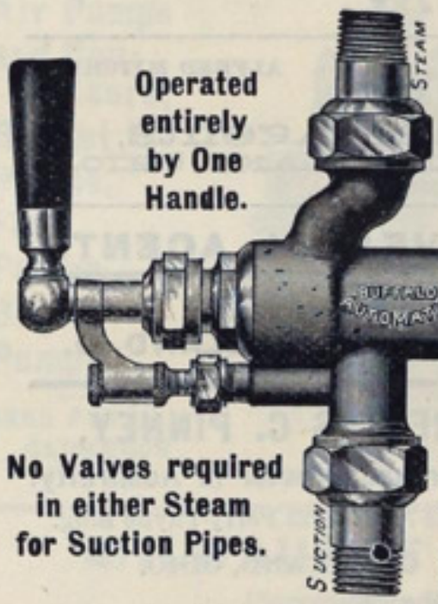

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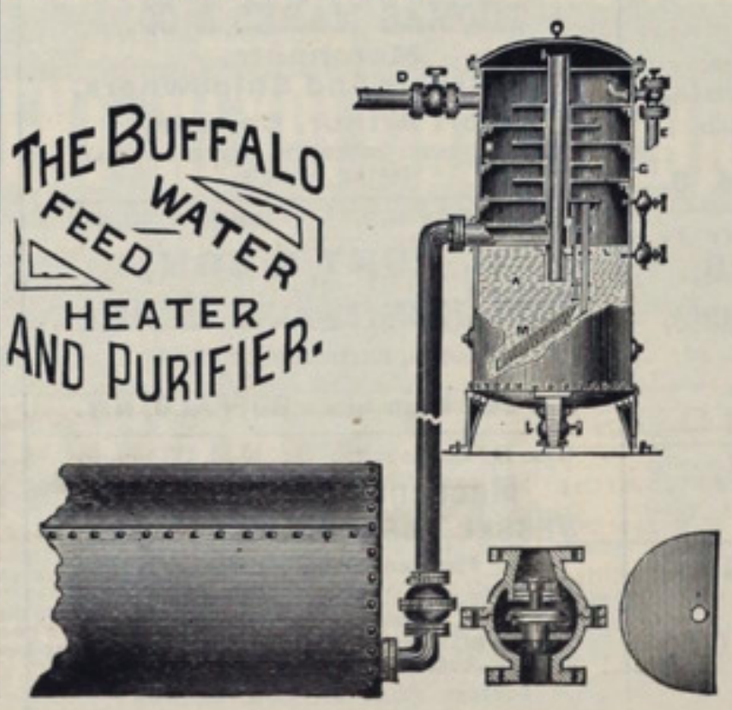

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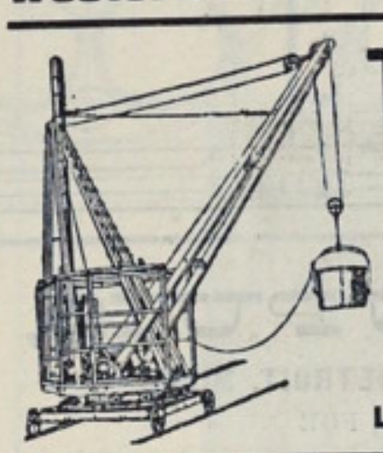

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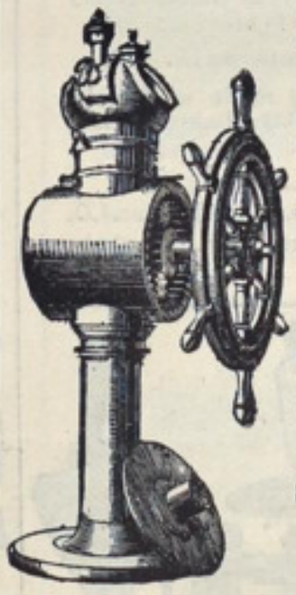

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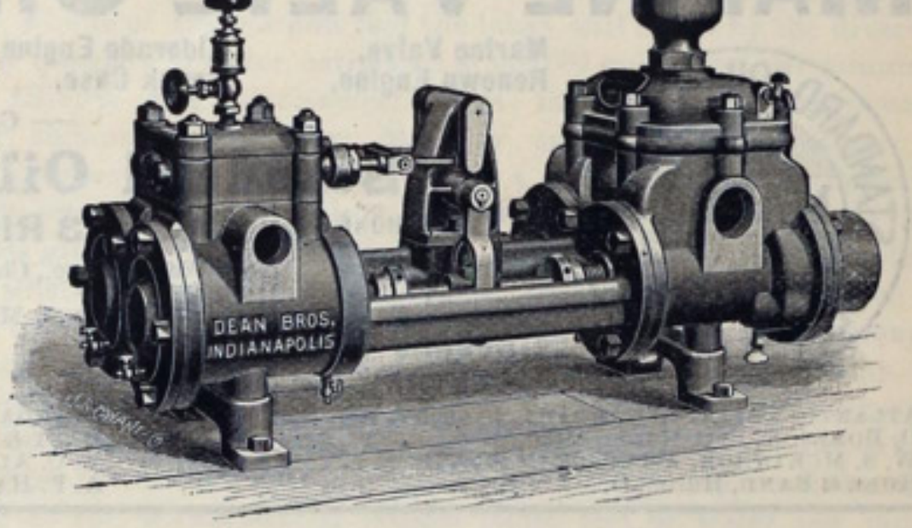

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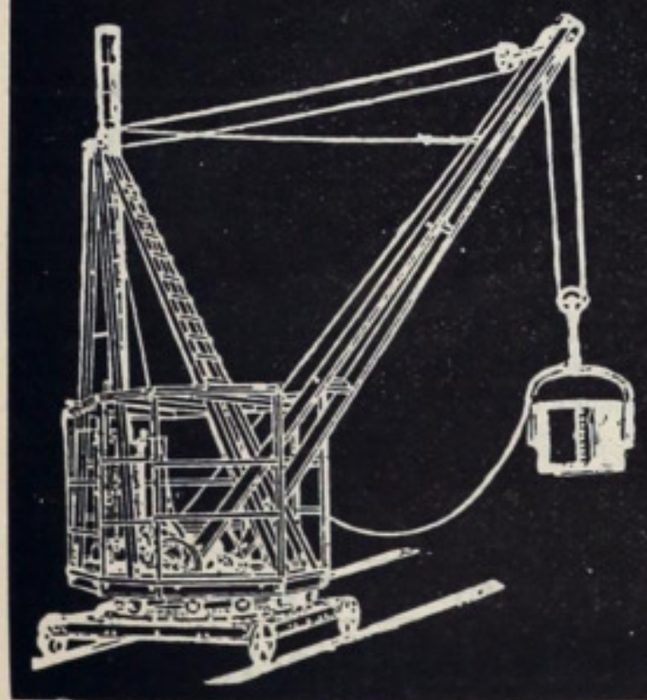

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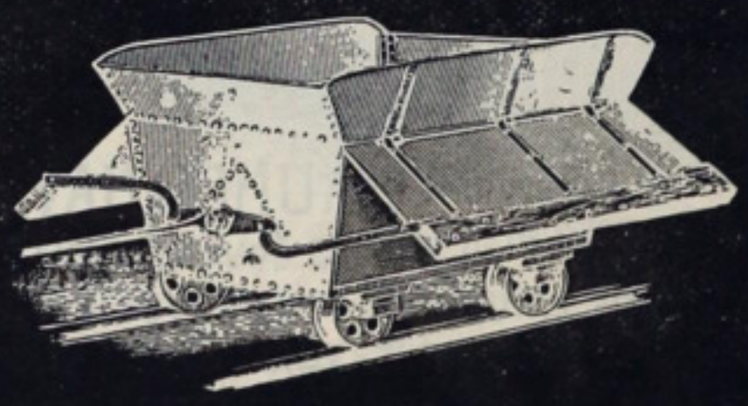

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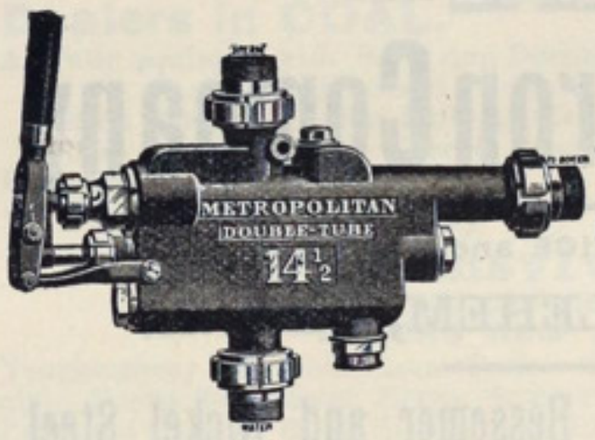

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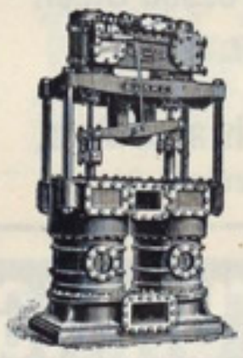

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